УДК 621.3

INCREASING OF SHOPPING MALLS ESCALATORS ELECTRIC DRIVES ENERGY PERFORMANCE

А. Д. ИВАНОВ
Научный руководитель Б. И. ФИРАГО, д-р техн. наук, проф.
Консультант Г. И. СВИДИНСКАЯ
Белорусско-Российский университет

For a long period of time, an unregulated electric drive based on squirrel cage asynchronous motor was used as an electric drive system. Electric motors of common industrial main execution and increased starting torque electric motors were used. This unregulated electric drive has a relatively low efficiency and high energy consumption. In order to eliminate these shortcomings, we make a comparison of the three systems of AC drives.

Three electric drive system were compared to each other: an unrelated electric drive, a thyristor voltage regulator – an asynchronous motor (TVR – AM) and a frequency converter – an asynchronous motor (FC – AM). Calculation of power losses is carried out in accordance with the load schedules for these electric drive systems. We calculate the power losses to determine the energy efficiency and energy consumption. A comparison was made between average efficiencies and energy consumption per working day of the shopping mall, where the escalator is installed. All calculations were performed for a shopping malls escalator with a height of 3 m, an inclination angle of 30 degrees and a step width of 600 mm. Table 1 represents the comparison results for this three electric drive systems.

Table 1. Comparison of characteristics of electric drive systems (average efficiency, energy consumption)

System of electric drive	Average efficiency	Energy consumption, kWh
Unregulated electric drive	0,83	20,706
TVR – AM	0,84	20,126
FC – AM	0,92	18,442

As can be seen from Table 1, the system of an electric drive the frequency converter – an asynchronous motor has the best characteristics (the highest efficiency, the lowest energy consumption). The system a thyristor voltage regulator – an asynchronous squirrel-cage motor has characteristics comparable to those of an unregulated electric drive. Therefore, from an energy point of view, it is desirable not to use this electric drive system, but to use a frequency converter – an asynchronous motor. We recommend to use a frequency converter – a squirrel-cage asynchronous motor as the electric drive system on the shopping malls escalators.